tric sparks through a tube containing hydrogen at the pressure of one atmosphere, we shall see that the colour of the incandescent gas is a bright carmine red, the spectrum of which can easily be observed by placing the spark tube in front of the slit of one of the spectroscopes before described. This arrangement is one that is in daily use in many of our laboratories, and it must be borne in mind as being the *modus operandi* by which a great deal of the work has been done to which I shall have to allude shortly. If again we take a tube which contains hydrogen that has been extremely rarefied, and pass a series of electric sparks through it, instead of having the brilliant red colour, we shall have a pale greenish spark, quite different from the former. This great difference is due to the difference in the pressures of the hydrogen of the two cases.

The two spectra are equally distinct, the red light shows three splendid lines, one in the red, another in the bluish green, and the third in the violet, together with a considerable amount of continuous spectrum, whilst almost the only spectrum which can be obtained in the second case, is a single green line in the same position as the former green line spoken of. There is also this difference which will be observed, that the green line obtained from the tube at the atmospheric pressure is very broad and indistinct at the edges; and that the line as seen from the almost vacuous tube is very thin, comparatively speaking, and perfectly sharp and well defined. If we were to take another tube, with a pressure somewhere between the two already mentioned, it would be seen that this green line was not so wide and woolly as in the tube at one atmosphere, and yet not so sharp and well defined as in the almost vacuous tube. Thus it will be seen that this widening out of the line is due to the difference of pressure.

J. NORMAN LOCKYER

(*To be continued.*)

NOTES

OUR readers will be sorry, though not surprised, to hear that the venerable Professor Sedgwick died at Trinity College, Cambridge, on the morning of the 27th instant, aged 87 years. He was fifth wrangler in Trinity in 1808, and was elected to a fellowship in 1810. His contributions to science were very numerous, and are mainly to be found in the Transactions of various learned societies.

THE Vice-Chancellor of Cambridge University has given notice that the election of a Woodwardian Professor of Geology, in the place of Dr. Sedgwick, will be held in the Senate House on Thursday, February 20, at 1 P.M. The Vice-Chancellor and Proctors will receive the votes from 1 to 2.30, when the election will be declared. The stipend attached to the professorship is 500*l*. per annum.

WE are very glad indeed to hear that renewed and better organised efforts are likely to be made to induce Government to undertake the expense of an Arctic expedition. We have good reason to believe that Sir Henry Rawlinson will address a letter to the President of the Royal Society urging the importance of that body taking a lead in the advocacy of such an expedition. This is as it should be, and we have no doubt if the matter is gone about in a thoroughly well considered manner, a second rebuff will not be experienced. Meanwhile we are glad to learn from an obliging correspondent that Mr. Leigh Smith will proceed on his third voyage of Arctic discovery in the spring. He has a fine strong steamer, the *Diana*, admirably adapted for the purpose; and will undoubtedly achieve all that can be done in the way of discovery in the Spitzbergen seas, during the season of 1873. For Mr. Smith is a good observer and explorer, and is now becoming a veteran Arctic voyager. In 1871 he made the most remarkable voyage in that direction since 1707, discovering a large extent of coast line both on the north and south sides of North East Land. He also attained the highest latitude that has been reached in a ship, except by Scoresby and the Swedes. In 1872 he went out again, and though the unfavourable state of the ice prevented him from doing much, he succeeded in taking a very important series of observations of sea-temperatures at various depths. In 1873 he will again, with better means and in a steamer instead of a sailing vessel, make an attempt to explore the unknown lands east of Spitzbergen, and to attain the highest latitude that skill and perseverance will enable him to reach.

THE Senior Wrangler at Cambridge this year is Mr. Thomas Olver Harding, eldest son of the Rev. Thomas Harding, Wesleyan minister of Whitehaven. Mr. Harding, in January, 1866, gained the first exhibition at the matriculation examination of the London University, and the Gilchrist Scholarship at University Hall. In 1867 he gained the Andrews Scholarship in mathematics at University College. In 1868 he proceeded to the degree of B.A., in the University of London; and in 1869 and 1871 he passed the first and second examinations for the degree of B.Sc., gaining the exhibition in mathematics at each. Last year he was elected fellow of University College. In 1869 he entered Trinity as senior minor scholar in mathematics, and was elected foundation scholar in 1871. Mr. Harding has just completed his twenty-third year. His private tutor was Mr. Routh; his college tutor the Rev. E. W. Blore. The Second Wrangler, Mr. Edward John Nanson, was educated at the Grammar Schools of Penrith and Ripon. In 1869 he obtained a Minor Scholarship at Trinity College. In July 1869, he commenced reading with Mr. Routh, of St. Peter's College. In 1870 he obtained a Foundation Scholarship. He was Prizeman, and placed in the first class at each of the annual College Examinations. His college tutor was Mr. Blore.

AN alteration has been made in Prof. Tyndall's arrangements. We are now enabled to state that he will leave America on the 5th of next month in the *Cuba*.

WE are glad to see from the account of the annual meeting of the Anthropological Institute officially forwarded to us, that Prof. Busk has been elected President, and along with him the following strong Council:—Vice-Presidents—John Beddoe, M.D.; J. Barnard Davis, M.D., F.R.S.; John Evans, F.R.S.; Col. A. Lane Fox, F.S.A.; Prof. Huxley, F.R.S.; Sir John Lubbock, Bt., F.R.S. Director—E. W. Brabrook, F.S.A. Treasurer—J. W. Flower, F.G.S. Council—H. G. Bohn, F.R.G.S.; Capt. R. F. Burton; A. Campbell, M.D.; Hyde Clark; W. Boyd Dawkins, F.R.S.; Prof. P. M. Duncan, F.R.S.; Robert Dunn, F.R.C.S.; David Forbes, F.R.S.; A. W. Franks; Francis Galton, F.R.S.; C. R. Markham, C.B.; Capt. Sher. Osborn, C.B., R.N.; Capt. Bedford Pim, R.N.; F. G. H. Price, F.G.S.; J. E. Price; F. W. Rudler, F.G.S.; C. R. Des Ruffières, F.R.S.L.; W. Spottiswoode, V.P.R.S.; E. Burnet Tylor, F.R.S.; A. R. Wallace, F.L.S.

A WORK of considerable importance, a geological map of Australia and Tasmania, has been recently commenced by Mr. R. Brough Smyth, secretary to the Mining department of the Australian Government, which, when finished, will be of value not only to the colony, but to the whole scientific world. As the Minister of Mines has cordially approved of the work, it is intended to communicate with the Governments of the various colonies, forwarding a draft of the map after it has been partially completed from the sources at hand, and a scale showing the colours of the various rock formations, with a request that they will as far as possible fill in the blanks from the records of the departments in the respective colonies. By this means it is anticipated that much reliable information will be obtained, as no doubt the surveyors-general of the colonies have in their possession many reports relative to the rock formations of their colonies. The map has been compiled from various sources, some of the maps and reports from which it has been taken having been completed as far back as 1834; but to show the accuracy with which the various surveys have been made, it may be mentioned that in some cases where the geological formation of a district has been compiled from two surveys, made perhaps at the interval of many years, and by different individuals, they have been found to join one another without the slightest mistake. Northern Australia is at present considered almost a *terra incognita* with regard to its geological character, but still a good portion of this part of the continent has been completed from the records of old explorers. It is intended by the compiler that in the first map only the boundaries of the several rock formations will be shown, as there are many large areas whose geological position has not yet been ascertained, and therefore no attempt will be made to classify them unless such classification is based on thorough geological information. The map will not be complete at first, but even in its present condition it will be of considerable value, and as the information it contains will be added to year by year, in the end it will become invaluable to the geological students of Australia.

THE Atlantic telegraph cable authorities have just done a very handsome thing. Astronomers belonging to different countries have, for some time past, felt the great inconvenience caused by the delay in transmitting notes of observations of new planets, comets, &c., by post, and therefore, especially in America, the Atlantic Cable naturally suggested itself as a means of exchanging discoveries. But the great expense of despatches by it, and the poverty of astronomers, have prevented their making use of this means of communication to any great extent. For some time past, the scientific editor of *Harper's Weekly* informs us, Prof. Henry, of the Smithsonian Institution, has been in correspondence with the authorities of the cable for the purpose of inducing them to transmit such communications free, and at last has had the pleasure of receiving from Mr. Cyrus W. Field the announcement that this boon has been granted. The precise details of the arrangement to be made are not yet fully established, but it is probable that, in case of important discoveries in America, the fact will be communicated by telegraph to the Smithsonian Institution, which will at once forward it to the observatories in Paris, London, Berlin, and Vienna, which, in turn, will supply the information to their associates. These same institutions will be the recipients, by telegraph, of the first announcements in Europe, to be transmitted to the Smithsonian Institution as before, and the information sent from Washington, either by the medium of the Associated Press, or by direct telegraphic despatch. The directors of the Atlantic Telegraph deserve great credit for their enlightened liberality, and for thus aiding in the scientific work of the day; and it is to be hoped that the inland American telegraph lines, as well as those in Europe, will not be behind in their co-operation, so as to make it an absolutely free interchange from one country to the other. It is probable that the information in regard to the discovery of comets in America will be sent more directly to the Vienna Academy of Sciences, as that body has a standing offer of reward for all such announcements, made under certain specific conditions.

M. LE BARON PIERRE CHARLES FRANCOIS DUPIN, who, so long ago as 1818, was elected to the French Academy for his geometrical writings, died on January 18, aged 89 years.

PROF. HUXLEY, the new Lord Rector of Aberdeen University, has given his friends there to understand that it will be impossible for him to deliver an inaugural address during the currency of the present session. He hopes to be able to do this at the beginning of next session.

THE following are the scientific arrangements at Oxford for this term:—The Rev. Bartholomew Price, M.A., will lecture on the "Dynamics of Rigid Systems," beginning on Thursday, Feb. 6. The Rev. C. Pritchard, M.A., will lecture on "The Ninth and Eleventh Sections of the Principia and the Lunar and Planetary Theories," beginning on Tuesday, Feb. 4. R. B. Clifton, M.A., will lecture on "Optical Instruments and Physical Optics," beginning on Saturday, Feb. 1. The Physical Laboratory of the University will be open daily for instruction in Practical Physics, from 10 to 4 o'clock, on and after Thursday, Jan. 30. G. Rolleston, D.M., will lecture on the "Nervous System," beginning on Friday, Jan. 31. The workrooms in the Anatomical Department are open daily, from 10 A.M. to 5 P.M. for practical instruction, under the superintendence of Mr. Charles Robertson, the Demonstrator of Anatomy, and Mr. S. J. Sharkey, of Jesus College. A special class will be formed for instruction in Practical Microscopy. Mr. E. Ray Lankester, M.A., of Exeter Coll., will lecture "On the General Classification of the Animal Kingdom," on Saturdays, at 1 o'clock, beginning Feb. 1. J. O. Westward, M.A., will deliver four lectures on Entomology—1, Structure; 2, Transformations; 3, Economy; 4, Classification of Articulata, beginning Feb. 14. J. Phillips, M.A., being engaged in arranging a part of the Museum collections, does not purpose to lecture in the present term; but he will be happy to meet members of the University, and to assist students of geology, *sine ulla solennitate*, on Mondays and Wednesdays, in the Museum, at 12 o'clock. Marmaduke Lawson, M.A., will continue his course of lectures this term.

THE following Lectures in Natural Sciences will be given at Cambridge during Lent Term. On Electricity and Magnetism, by Dr. Trotter, Mondays, Wednesdays, Fridays, at 11, commencing Friday, Jan 31. On Electricity and Magnetism (for the First Part of the Natural Sciences Tripos and the Special Examination for the Ordinary Degrees), by Mr. Trotter, Tuesdays, Thursdays, Saturdays, at 11, commencing Thursday, Jan. 30. On Chemistry, by Mr. Main, St. John's College, Tuesdays, Thursdays, Saturdays, at 12, commencing Thursday, Jan. 30. Instruction in Practical Chemistry will also be given. On Palæontology (the Annuloida, &c.), by Mr. Bonney, St. John's College, Tuesdays and Thursdays, at 9, commencing Thursday, Jan. 30. On Geology, (for the Natural Sciences Tripos, Physical Geology), by Mr. Bonney, Mondays, Wednesdays, and Fridays at 10, commencing Wednesday, Jan. 29. Elementary Geology (for the First Part of the Tripos and the Special Examination), Tuesdays and Thursdays at 11, commencing Tuesday, Feb. 4. On Botany (for the Natural Sciences Tripos), by Mr. Hicks, Sidney College, Tuesdays, Thursdays, Saturdays, at 11, in Lecture Room No. 1, beginning on Thursday, Jan. 30. On the Physiology of the Senses, by Dr. M. Foster, Mondays and Wednesdays at 1. A Course of Practical Physiology on Thursdays, at 11 A.M., commencing Thursday, Feb. 6. An Advanced Course of Practical Histology on Tuesdays, at 11 A.M., commencing Tuesday, Feb. 4.

A SLIGHT eruption of Vesuvius occurred last Saturday. Red-hot stones were thrown up in the midst of flames to a considerable height throughout the whole of yesterday, and at Castellamare the windows were shaken. On Sunday morning an unusual amount of smoke was issuing from the mountain.

THE Meteorological Society of Mauritius have resolved to prepare as complete a list as possible of the hurricanes which have been felt at Mauritius and at Bourbon in former times, and of the years that have been remarkable for droughts or rainfall. Their main purpose in doing so is to test the hypothesis that the frequency of storms and the amount of rainfall have periodicities. Meantime preliminary lists of hurricanes at the two places have been prepared, in the case of Bourbon from 1733 to 1754, and in the case of Mauritius from 1695 to 1847. In the former list there are only two years, 1741 and 1749, in which no mention is made of hurricanes, while the latter is apparently much more incomplete, having many gaps. While some of these gaps may be owing to the absence of hurricanes, still, no doubt, hurricanes have occurred which are not included in the list. But it is remarkable that many of the gaps occur about the time of minimum frequency of sun spots. It is to be hoped that the Society will be able to compile a pretty complete and trustworthy list, as such a list would go far to solve questions of high importance. It is to be hoped that with an efficient observatory, which Mauritius is likely soon to possess, and uninterrupted observation, complete data for future meteorologists may be gradually collected.

The following note from the *Colonial Farmer* (Frederickton, New Brunswick), concerning the recent shower, has been forwarded us:—A brilliant meteoric display was observed in the heavens early on Wednesday evening, Nov. 27th, and the clearness of the night gave every facility for witnessing this attractive exhibition. For at least two hours the falling meteors were visible in hundreds, and seemed to come from the Milky Way, with a course from the zenith to the south and south-west. Above 190 were counted in about twenty minutes. The shower commenced at dusk, and continued for two hours with increasing brilliancy, after which it gradually faded away.

Some months ago we announced that the glass of the great telescope of the Alleghany Observatory, one of the largest of the kind in America, and valued at about 4,000 dols., was stolen from the building, and all efforts to detect the robber and regain the plundered article were unavailing. We now learn from the *College Courant* that the lens has been recovered, having been stolen by two men, but for what purpose is not said. It was found to have received serious damage in the form of several scratches, which may require the regrinding of the glass at a cost of 30 or 40 per cent. of the original cost.

We learn from the *Athenæum* that Mr. Edward Thomas has been elected corresponding member of the French Academy, for his contributions to Oriental Numismatic Archæology.

We learn from the *British Medical Journal*, that Dr. C. J. B. Williams has been nominated by the Council of the Royal Medical and Chirurgical Society for the Presidency.

Mr. E. B. Nicholson, librarian of the Oxford Union Society, has been appointed to the Librarianship of the London Institution, in room of the late Mr. J. C. Brough.

The Fifth Annual Report of the Eastbourne Natural History Society shows that it continues prosperous, and has been making valuable additions to our knowledge of the Natural History of the district in all its departments.

The lioness, which has so successfully reared the cubs born in the Zoological Gardens, July 8, 1872, died on the 21st inst.

We have received an advance sheet of the next number of Petermann's *Mittheilungen* containing the second article on Dr. Livingstone's Exploration of the Upper Congo, appended to which is a splendidly constructed map of the section of Africa included between 2° and 12½° S. lat. and 22°—40° E. long., in which not only the most recent discoveries are filled in, but the routes of all travellers are given from Lacerda in 1798 down to Livingstone and Stanley in 1871-2. Moreover by seven shades of colour the heights of the various regions are indicated from 1000 up to 18,710 feet.

The whole of No. 34 of the supplement to Petermann's *Mittheilungen* is occupied with the journal kept by Jerhard Rohlfs, who in 1865-6-7, journeyed through North Africa, from Lake Tsad to the Gulf of Guinea. Two magnificent maps accompany the narrative, the one representing the region to the south of Lake Tsad, and showing the routes of Rohlfs and of all previous travellers through that region; the other represents the country from Borneo to Lagos, and contains the routes of travellers from Clapperton and Landor down to Rohlfs.

Lieutenant Grandy, leader of the Livingstone Congo Expedition, has written to Sir Henry Rawlinson reporting his arrival at Sierra Leone on December 14, where he got together his exploring party, consisting of his brother, Mr. M. B. Grandy, two Congo men to act as interpreters, 19 Kroomen, and a steady native from the police, Daniel E. Gabbidon. The party left for the South Coast on the 27th, in good health, after an inspection and a few cheering words at Government-house. The local Government presented Lieutenant Grandy with a travelling tent, water-proof blankets, and other useful articles.

We are glad to see that the botanical members of the Perthshire Society of Natural Science are preparing "a Flora of Perthshire," one of the richest counties, botanically, in the kingdom. Botanists who can assist with information are requested to communicate at once with Dr. Buchanan White, Dunkeld, than whom no more competent editor could be found.

A meeting was held the other evening which pledged itself to use every effort to establish a South London Museum on the model of that recently opened at Bethnal Green.

The first of a series of lectures was given on Tuesday evening the 21st inst., on the "Physical Geography of the Sea," in the Town Hall, Shoreditch, by Dr. Carpenter. The lecture was listened to by an audience of 2,000 persons, chiefly of the working classes, men and women, with marked attention, for nearly two hours.

A collection of Saxon antiquities, of rare value, has been presented to the library and museum of Trinity College, Cambridge, by Mr. White, sub-librarian of the society. These were obtained from the site of an Anglo-Saxon cemetery, situate at a place known (and described on maps 200 years old) as "Edixhill hole," near Orwell, Cambridgeshire. Mr. White's donation includes various implements in iron and spear heads, shield bosses, and handles, &c, and some articles used in hunting and for domestic use. Among the collection are three jaw bones, one of immense size, all having the teeth perfectly sound. The collection has been deposited in the library.

The *Medical Record* for January 15, in a note entitled "Science the Peace-maker," has the following:—"Immediately after the war, the French Societies occupied themselves in striking off the roll the names of all German Associates, and French *savans* withdrew theirs from the German societies of which they were honorary members. We are glad to note, as indicating a return to a more sound and philosophic mind, that at a recent meeting of the Berlin Chemical Society M. Cahours, an eminent Frenchman, applied for, and was accorded, admission to the honorary membership."

The principal article in the *Revue Scientifique* for January 25 is a long one by M. Léon Dumont on the theory of evolution in Germany, with special reference to the doctrines of Haeckel.

A well-known British explorer, in the person of Commander Alexander John Smith, has recently died at Sandhurst, Victoria. This gentleman was lieutenant on board the *Erebus*, under Captain Sir James Clark Ross, in the expedition to investigate the magnetism of the Antarctic region, and was subsequently one of the officers in charge of the magnetic observatory at Hobart Town.